SCOTT BANTA, PHD

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EDUCATION

Rutgers, The State University of New Jersey PhD 2002
Department of Chemical and Biochemical Engineering MS 2000

- Advisor: Stephen Anderson, PhD (Department of Molecular Biology and Biochemistry)
- NIH pre-doctoral Biotechnology Training Program, 4.0 GPA

University of Maryland, Baltimore County BSE 1997
Department of Chemical and Biochemical Engineering

- Graduation with Honors, Minors in Mathematics and Physics

POSTDOCTORAL TRAINING

Harvard Medical School 2002-2004
Center for Engineering in Medicine, Shriners and Massachusetts General Hospitals

- Advisor: Martin Yarmush, MD, PhD

ACADEMIC APPOINTMENTS

Columbia University
Associate Professor, Department of Chemical Engineering 2009-present
Assistant Professor, Department of Chemical Engineering 2004-2009

TEACHING EXPERIENCE

Columbia University

- CHEN 9000 Chemical Engineering Colloquium Spring 2009-11, Fall 2009-10
- CHEN 4800 Protein Engineering Fall 2005-06, Spring 2008,2010
- CHEN 3810 Chemical Engineering Laboratory Spring 2005-09, 2011
- CHEN 4140 Chemical and Biochemical Engineering Separations Fall 2004-10

Rutgers, The State University of New Jersey

- 155:492 Protein Engineering Spring 2001

AWARDS AND HONORS

- James D. Watson Investigator Program Award, New York State Office of Science, Technology and Academic Research (NYSTAR), 2005
- Martin L. Yarmush Award for Excellence in Biotech Research Poster Award, 2001
- Dissertation Teaching Award, Rutgers, 2000
- Graduate Student Excellence Award, Rutgers, 1999
- First Place Student Poster Award: Food, Pharmaceuticals, Bioengineering. and Fundamentals in Life Sciences, AIChE Miami FL, 1998
- Outstanding Senior in Chemical and Biochemical Engineering, UMBC, 1997

PEER REVIEWED PUBLICATIONS (37 TOTAL)

(COLUMBIA UNIVERSITY SUBMITTED, 4 TOTAL)

Kang, W.H., Simon, M.J., Gao, S., **Banta, S.**, and Morrison III, B. "Attenuation of astrocyte activation by TAT delivery of a peptide JNK inhibitor: Implications for therapeutic targeting" *Journal of Neurotrauma* (Submitted).

Sahin, A., Dooley, K.P., West, A.C., Cropek, D.M., and **Banta, S.** "A dual enzyme biosensor for detection of organophosphorus compounds using organophosphorus hydrolase and horseradish peroxidase" *Biosensors and Bioelectronics* (Submitted).

Gao, S., Simon, M.J., Morrison III, B., and **Banta, S.** "An unusual cell penetrating peptide identified using a plasmid display-based functional selection platform" *ACS Chemical Biology* (Submitted, In Revision).

Glykys, D.J., Szilvay, G.R., Tortosa, P., Suarez Diez, M., Jaramillo, A., and **Banta, S.** "Pushing the limits of automatic computational protein design: computational design, expression, and characterization of a large synthetic protein based on a fungal laccase scaffold" *Systems and Synthetic Biology* (Submitted, In Revision).

(COLUMBIA UNIVERSITY PUBLISHED, 22 TOTAL)

Simon, M.J., Gao, S., Kang, W.H., **Banta, S.,** and Morrison III, B. (2010) "TAT is not capable of transcellular delivery across an intact endothelial monolayer in vitro" *Annals of Biomedical Engineering* (Accepted, In Press).

Gao, S., Simon, M.J., Morrison III, B., and **Banta, S.** (2010) "A plasmid display platform for the selection of peptides exhibiting a functional cell penetrating phenotype" *Biotechnology Progress* (Accepted, In Press).

Simon, M.J., Kang, W.H., Gao, S., **Banta, S.,** and Morrison III, B. (2010) "Increased delivery of TAT across an endothelial monolayer following ischemic injury" *Neuroscience Letters* **486**(1) 1-4.

Campbell, E., Wheeldon, I.R., and **Banta, S.** (2010) "Broadening the cofactor specificity of a thermostable alcohol dehydrogenase using rational protein design results in novel kinetic transient behavior" *Biotechnology and Bioengineering* **107**(5) 763-774.

Wu, J., Cropek, D.M., West, A.C. and **Banta, S.** (2010) "Development of a troponin I biosensor using a peptide obtained through phage display" *Analytical Chemistry* **82**(19) 8235-8243.

Banta, S., Wheeldon, I.R., and Blenner, M. (2010) "Protein engineering in the development of functional hydrogels" *Annual Review of Biomedical Engineering* **12** 176-186.

Lu, H.D., Wheeldon, I.R., and **Banta, S.** (2010) "Catalytic biomaterials: Engineering organophosphate hydrolase to form self-assembling enzymatic hydrogels" *Protein Engineering, Design and Selection* **23**(7) 559-566.

Blenner, M.A., Shur, O., Szilvay, G.R., Cropek, D.M., and **Banta, S.** (2010) "Calcium-induced folding of a beta roll motif requires C-terminal entropic stabilization" *Journal of Molecular Biology* **400**(2) 244-256.

Park, J.P., Cropek, D.M., and **Banta, S.** (2010) "High affinity peptides for the recognition of the heart disease biomarker troponin I using phage display" *Biotechnology and Bioengineering* **105**(4) 678-686.

Szilvay, G.R., Blenner, M.A., Shur, O., Cropek, D.M., and **Banta, S.** (2009) "A FRET-based method for probing the calcium-dependent conformational behavior of an intrinsically

disordered beta roll domain from the *Bordetella pertussis* adenylate cyclase" *Biochemistry* **48**(47) 11273-11282.

Wheeldon, I.R., Campbell, E. and **Banta, S.** (2009) "A chimeric fusion protein engineered with disparate functionalities— enzymatic activity and self assembly" *Journal of Molecular Biology* **392**(1) 129-142.

Simon, M.J., Gao, S., Kang, W.H., **Banta, S.,** and Morrison III, B. (2009) "TAT-mediated intracellular protein delivery to primary brain cells is dependent on glycosaminoglycan expression" *Biotechnology and Bioengineering* **104**(1) 10-19.

Chockalingam, K., Lu, H.D., and **Banta, S.** (2009) "Development of a bacteriophage-based system for the selection of short structured peptides" *Analytical Biochemistry* **388**(1) 122-127.

Gao, S., Simon, M.J., Morrison III, B., and **Banta, S.** (2009) "Bifunctional chimeric fusion proteins engineered for DNA delivery: Optimization of the protein to DNA ratio" *Biochimica et Biophysica Acta (General Subjects)* **1790**(3) 198-207.

Glykys, D.J., and **Banta, S.** (2009) "Metabolic control analysis of an enzymatic biofuel cell" *Biotechnology and Bioengineering* **102**(6) 1624-1635.

Chen, X.J., West, A.C., Cropek, D.M., and **Banta, S.** (2008) "Detection of the superoxide radical anion using various alkanethiol monolayers and immobilized cytochrome c" *Analytical Chemistry* **80**(24) 9622-9629.

Wheeldon, I.R., Gallaway, J.W., Calabrese Barton, S., and **Banta, S.** (2008) "Bioelectrocatalytic hydrogels from electron-conducting metallopolypeptides coassembled with bifunctional enzymatic building blocks" *Proceedings of the National Academy of Sciences of the United States of America* **105**(40) 15275-15280.

Blenner M.A., and **Banta, S.** (2008) "Characterization of the 4D5Flu single chain antibody with a stimulus-responsive elastin-like peptide linker: A potential reporter of peptide linker conformation" *Protein Science* **17**(3) 527-536.

Gallaway, J., Wheeldon, I.R., Rincon, R., Atanassov, P., **Banta, S.**, and Calabrese Barton, S. (2008) "Oxygen-Reducing Enzyme Cathodes Produced from SLAC, a Small Laccase from *Streptomyces coelicolor*, For Use at Neutral pH" *Biosensors and Bioelectronics* **23**(8) 1229-1235.

Wheeldon, I.R., Calabrese Barton, S., and **Banta, S.** (2007) "Bioactive Proteinaceous Hydrogels from Designed Bi-functional Building Blocks" *Biomacromolecules* **8**(10) 2990-2994.

Chockalingam, K., Blenner, M., and **Banta, S.** (2007) "Design and Application of Stimulus-Responsive Peptide Systems" *Protein Engineering, Design and Selection* **20**(4) 155-161.

Banta, S.*, Megeed, Z.*, Casali, M., Rege, K., and Yarmush, M.L. (2007) "Engineering Protein and Peptide Building Blocks for Nanotechnology" *Journal of Nanoscience and Nanotechnology* **7**(2) 387-401 (*co-first authors).

(HARVARD UNIVERSITY, 6 TOTAL)

Casali, M., **Banta, S.**, Zambonelli, C., Megeed, Z., and Yarmush, M.L. (2008) "Site-directed mutagenesis of the hinge peptide from the Hemagglutinin protein: Enhancement of the pH-responsive conformational change" *Protein Engineering, Design and Selection* **21**(6) 395-404.

Banta, S.*, Vemula, M.*, Yokoyama, T., Jayaraman, A., Berthiaume, F., and Yarmush, M.L. (2007) "Contribution of Gene Expression to Metabolic Fluxes in Hypermetabolic Livers Induced Through Burn Injury and Cecal Ligation and Puncture in Rats" *Biotechnology and Bioengineering* **97**(1) 118-137 (*co-first authors) (**Featured in Editor's Spotlight**).

Banta, S., Yokoyama, T., Berthiaume, F., and Yarmush, M.L. (2005) "Effects of Dehydroepiandrosterone administration on rat hepatic metabolism following thermal injury" *Journal of Surgical Research* **127**(2) 93-105.

Yokoyama, T., **Banta, S**., Nagrath, D., Berthiaume, F., Tompkins, R.G., and Yarmush, M.L. (2005) "Evolution of intrahepatic carbon, nitrogen, and energy metabolism in a D-galactosamine-induced rat liver failure model" *Metabolic Engineering* **7**(2) 88-103.

Banta, S., Yokoyama, T., Berthiaume, F., and Yarmush, M.L. (2004) "Metabolic Flux Analysis of the perfused rat hindquarter: Effects of thermal injury with and without insulin" *Biotechnology and Bioengineering* **88**(5) 613-629.

Yarmush, M.L. and **Banta, S.** (2003) "Metabolic Engineering: Advances in Modeling and Intervention in Health and Disease" *Annual Review of Biomedical Engineering* **5** 349-381.

(RUTGERS UNIVERSITY, 5 TOTAL)

Sanli, G., **Banta, S.,** Anderson, S., and Blaber, M. (2004) "Structural alteration of cofactor specificity in Corynebacterium 2,5-diketo-D-gluconic acid reductase" *Protein Science* **13**(2) 504-512.

Banta, S., Boston, M., Jarnagin, A., and Anderson, S. (2002) "Mathematical modeling of *in vitro* enzymatic production of 2-keto-L-gulonic acid using NAD(H) or NADP(H) as cofactors" *Metabolic Engineering* **4**(4) 273-284.

Banta, S., and Anderson, S. (2002) "Verification of a novel NADH-binding motif: Combinatorial mutagenesis of three amino acids in the cofactor binding pocket of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase" *Journal of Molecular Evolution* **55**(6) 623-631.

Banta, S., Swanson, B.A., Wu, S., Jarnagin, A., and Anderson, S. (2002) "Optimizing an artificial metabolic pathway: Engineering the cofactor specificity of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase for use in vitamin C biosynthesis" *Biochemistry* **41**(20) 6226-6236.

Banta, S., Swanson, B.A., Wu, S., Jarnagin, A., and Anderson, S. (2002) "Alteration of the specificity of the cofactor-binding pocket of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase A" *Protein Engineering* **15**(2) 131-140. (**Featured on cover**)

BOOK CHAPTERS AND OTHER ARTICLES

Atanassov, P., Apblett, C., **Banta, S.** Brozik, S., Calabrese Barton, S., Cooney, M., Liaw, B. Y., Mukerjee, S., and Minteer, S.D. (2007) "Enzymatic Biofuel Cells" *Interface* **16**(2) 28-31

Banta, S. (2006) "Protein Engineering" The Biomedical Engineering Handbook, 3rd Ed, Edited by J.D. Bronzino, CRC Press, Boca Raton, Florida.

Banta, S. and Zupke, C. (2006) "Metabolic Engineering" The Biomedical Engineering Handbook, 3rd Ed, Edited by J.D. Bronzino, CRC Press, Boca Raton, Florida.

PATENTS

Banta, S., Chandran, K., and West, A. "Biofuel production using ammonia-oxidizing bacteria" (2010) Provisional Patent Application Filed

Banta, S., Morrison III, B., Gao, S., and Simon, M.J. "Evolved cell penetrating peptides for targeted therapeutic delivery and methods of use thereof" (2009) Provisional Patent Application Filed

Banta, S., Calabrese-Barton, S., and Wheeldon, I. "Self-assembling protein hydrogel with bio-active protein" (2008) (WO/2008/011204) U.S. Patent Pending.

Anderson, S. and **Banta, S.** "Design and production of mutant 2,5-diketo-D-gluconic acid reductase enzymes with altered cofactor dependency" (2002) U.S. Patent Number 6,423,518.

INVITED RESEARCH SEMINARS

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, Rutgers University, Piscataway NJ, Nov. 2010

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, Ohio State University, Columbus OH, Oct. 2010

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, NYU Poly, Brooklyn, NY, Oct. 2010

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, Arizona State University, Tempe AZ, Sept. 2010

Banta, S. "Protein Engineering for Improved Electron Transfer in Bioelectrocatalysis Applications" Invited talk, BIO World Congress on Industrial Biotechnology and Bioprocessing, Washington, DC, June 2010

Banta, S. "Engineering Enzymes to Self-Assemble into Catalytic Biomaterials" Invited talk, ARO/ARL sponsored Bio-Directed Assembly Workshop, Keystone, CO, May 2010

Banta, S. "Protein Engineering for Bioelectrocatalysis: We can do more than just Vmax" Invited keynote talk, Electrochemical Society Meeting, Vancouver, BC, CA, Apr 2010

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, Michigan State University, East Lansing MI, Feb 2010

Banta, S. "Protein Engineering for Biosensors and Biofuel Cells" Invited research seminar, University of New Mexico, Albuquerque NM, May 2009

Banta, S. "Self-Assembling Enzymatic Hydrogels from Designed Bifunctional Building Blocks" Invited research seminar, University of Medicine and Dentistry of New Jersey, Piscataway NJ, Sept. 2008

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** "Directed Evolution of Cell Penetrating Peptides for Delivery Across the Blood Brain Barrier to Specific Cellular Targets" Invited research seminar, Wyeth Pharmaceuticals, Princeton, NJ, May 2008

Banta, S. "Engineering of Stimulus-Responsive Peptides and their Application to Bioelectrocatalysis and Biosensing" Invited research seminar, University of Tennessee, Knoxville TN, Sept. 2007

Banta, S. "Peptide Engineering: Applications in Nanotechnology, Bioelectrocatalysis and Drug Delivery" Invited research seminar, Ecole Polytechnique, Paris, France, Jun. 2007

Banta, S. "Peptide Engineering: Applications in Nanotechnology, Bioelectrocatalysis, and Drug Delivery" Invited research seminar, University of Wyoming, Laramie WY, Mar. 2007

Banta, S. "Engineering of Stimulus-Responsive Peptides and their Application to Bioelectrocatalysis and Biosensing" Invited research seminar, Colorado State University, Ft. Collins CO, Mar. 2007

Banta, S. "Directed Evolution of Peptides: Applications in Nanotechnology and Bioelectrocatalysis" Invited research seminar, Rensselaer Polytechnic Institute, Troy NY, Aug. 2006

Banta, S. "Applications of Protein Engineering and Metabolic Engineering: Vitamin C, Hepatic Metabolism, and Biofuel Cells" Invited research seminar, Sandia National Labs and The University of New Mexico, Albuquerque NM, Sept. 2005.

Banta, S. "Applications of Protein and Metabolic Engineering to Health and Disease" Invited research seminar, Northeastern University, Boston, MA, Feb. 2004

Banta, S. "Applications of Protein and Metabolic Engineering to Health and Disease" Invited research seminar, Drexel University, Philadelphia, PA, Jan. 2004

Banta, S. "Applications of Protein and Metabolic Engineering to Health and Disease" Invited research seminar, Columbia University, New York, NY, Jan. 2004

Banta, S. "Applications of Protein and Metabolic Engineering to Health and Disease" Invited research seminar, University of Maryland, Baltimore County, Baltimore, MD, Dec. 2003

Banta, S. "Applications of Protein and Metabolic Engineering to Health and Disease" Invited research seminar, Rutgers University, Piscataway, NJ, Nov. 2003

Banta, S. "Engineering the cofactor specificity of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase for use in vitamin C biosynthesis" Invited research seminar, Center for Engineering in Medicine, Harvard Medical School, Boston, MA, Oct. 2001

Banta, S. "Engineering the cofactor specificity of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase for use in vitamin C biosynthesis" Invited research seminar, National Cancer Institute, National Institutes of Health, Bethesda, MD, Oct. 2001

SELECTED OTHER PRESENTATIONS (2004-PRESENT)

Shur, O. (speaker), Szilvay, G., Blenner, M.A., Cropek, D.M. and **Banta S.** "Directed Evolution of the Intrinsically Disordered and Allosterically Regulated Beta Roll Subdomain for Biomolecular Recognition" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Felsovalyi, F. (speaker), Mangiagalli, P., Bureau, C., Kumar, S.K, and **Banta S.** "Evaluating the Role of Solid Surfaces in Inducing Conformational Changes of Adsorbed and Desorbed Proteins" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Campbell, E. (speaker) and **Banta S.** "Protein Engineering of a Thermostable Alcohol Dehydrogenase to Improve Activity with Biomimetic Cofactors and Alternate Substrates" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Wu, J., Cropek, D.M. (speaker), West, A.C., and **Banta S.** "Quartz Crystal Balance (QCM) and Electrochemical Impedance Detection of the Protein Biomarker Troponin I Using Peptides Obtained From the Biopanning of a Phage-Display Library" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Sahin, A. (speaker), Cropek, D.M. West, A.C., and **Banta S.** "Dual Enzyme Biosensor for Detection of Organophosphorus Compounds Using Organophosphorus Hydrolase and Horseradish Peroxidase" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Shur, O. (speaker), Szilvay, G., Blenner, M.A., Cropek, D.M. and **Banta S.** "Structure/Function Analysis for the Optimization of the Beta Roll Motif as a Novel Scaffold for Engineering Biomolecular Recognition " AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Wilson, R. (speaker), Cropek, D.M. and **Banta S.** "On Chip Electrochemical Detection of Biomarkers for Detection of Water Borne Toxins" AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

Szilvay, G.R., Li, C., Brocato, S., Lau, C., Ivnitski, D., Chi, E., Atanassov, P., and **Banta, S.** (speaker) "A Laccase Protein Engineered for Site-Specific Immobilization on Carbon Nanotube Modified Electrodes " National Meeting of the American Chemical Society, San Francisco, CA, Mar. 2010

Sahin, A. (speaker), Lu, H.D., Wheeldon, I.R., West, A.C., and **Banta, S.** "Engineering Organophoshphate Hydrolase to Self-Assemble into Hydrogels for Use in Sensing and Decontamination Applications" National Meeting of the American Chemical Society, San Francisco, CA, Mar. 2010

Campbell, E. (speaker) and **Banta, S.** "Protein Engineering of a Thermostable Alcohol Dehydrogenase: Rational Alteration of Substrate Specificity and Development of a Novel Selection System for Directed Evolution" National Meeting of the American Chemical Society, San Francisco, CA, Mar. 2010

Wu, J., Park, J.P., West, A.C., Cropek, D.M., and **Banta, S.** (presenter) "Development of New Electrochemical Biosensors for Protein Biomarker Detection" National Meeting of the American Chemical Society, San Francisco, CA, Mar. 2010

Shur, O., Szilvay, G.R., Blenner, M.A., Cropek, D.M., and **Banta, S.** (presenter) "Directed Evolution of Allosterically Regulated Beta Roll Subdomains for Biomolecular Recognition" National Meeting of the American Chemical Society, San Francisco, CA, Mar. 2010

Banta, S. (speaker) and Cropek, D.M. "Beta Roll Peptide Structures for Allosterically Controlled Biomolecular Recogonition and Decontamination" Chemical and Biological Defense Science and Technology Conference, Dallas, TX, Nov. 2009

Park, J.P., Wu, J., West, A.C., Cropek, D.M., and **Banta, S.** (speaker) "Identification of Troponin I Binding Peptides Using Phage Display for Biosensor Development" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Campbell, E. (speaker), Wheeldon, I.R., and **Banta, S.** "Cofactor Engineering of a Thermostable Aldo-Keto Reductase Enzyme: Altering Cofactor Specificity and Development of a Novel Directed Evolution Selection Platform" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Shur, O. (speaker), Blenner, M.A., Szilvay, G.R., Cropek, D.M., and **Banta, S.** "Directed Evolution of Allosterically Regulated Beta Roll Subdomains for Biomolecular Recognition" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Blenner, M.A., Szilvay, G.R., Shur, O. (speaker), Cropek, D.M., and **Banta, S.** "Engineering Tools for Analysis of Intrinsically Disordered Proteins: Entropic Stabilization Enables a Type I Secretion Calcium Switch" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Gao, S. (speaker) Simon, M.J., Morrison III, B., and **Banta, S.** "Directed Evolution of Novel Cell Penetrating Peptides for Delivery to the Brain" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Wilson, R. (speaker), Cropek, D.M. and **Banta S.** "On Chip Electrochemical Detection of Biomarkers From Cell Cultures On Microfluidic Reactors" AIChE Annual Meeting, Nashville, TN, Nov. 2009

Wheeldon, I.R, Campbell, E., and **Banta, S.** (speaker) "Engineering Enzymes to Self-Assemble into Hydrogels for Bioelectrocatalysis" National Meeting of the American Chemical Society, Washington, D.C., Aug. 2009

Campbell, E. (speaker), Wheeldon, I.R. **Banta, S.** "Towards a general dehydrogenase enzymatic platform: Engineering an alcohol dehydrogenase for self-assembly and for activity with alternative substrates" National Meeting of the American Chemical Society, Washington, D.C., Aug. 2009

Gao, S. Simon, M.J., Morrison III, B., and **Banta, S.** (speaker) "Engineering of Targeted Cell Penetrating Peptides for Delivery to the Brain" National Meeting of the American Chemical Society, Washington, D.C., Aug. 2009

Szilvay, G.R. (speaker), Blenner, M.A., Shur, O., Cropek, D.M., and **Banta, S.** "The Beta Roll Peptide as a Novel Allosterically-Regulated Scaffold for Biomolecular Recognition" National Meeting of the American Chemical Society, Washington, D.C., Aug. 2009

Wheeldon, I.R, Campbell, E., and **Banta, S.** (presenter) "Engineering Enzymes to Self-Assemble into Hydrogels" Symposium of the Protein Society, Boston, MA, Jul. 2009

Blenner, M.A., Szilvay, G.R., Shur, O., Cropek, D.M., and **Banta, S.** (presenter) "The Beta-Roll Peptide as a Novel Allosterically-Regulated Scaffold for Biomolecular Recognition" Symposium of the Protein Society, Boston, MA, Jul. 2009

Wheeldon, I.R, Campbell, E., and **Banta, S.** (presenter) "Towards a general dehydrogenase enzymatic platform: Engineering an alcohol dehydrogenase for self-assembly and for activity with alternative substrates" Symposium of the Protein Society, Boston, MA, Jul. 2009

Szilvay, G.R. (presenter), Blenner, M.A., Shur, O., Cropek, D.M., and **Banta, S.** "Structural studies of the calcium-dependent conformational behavior of a beta roll peptide" Symposium of the Protein Society, Boston, MA, Jul. 2009

Banta, S. (speaker) "The Beta Roll Peptide as a Novel Allosterically-Regulated Scaffold for Biomolecular Recognition" Biochemical Engineering XVI, Burlington, VT, Jul. 2009

Wheeldon, I.R, Campbell, E., and **Banta, S.** (presenter) "Engineering Enzymes to Self-Assemble into Hydrogels" Biochemical Engineering XVI, Burlington, VT, Jul. 2009

Shur, O. (presenter) Blenner, M.A., Szilvay, G.R., Cropek, D.M., and **Banta, S.** "Directed Evolution of Allosterically Regulated Beta Roll Subdomains for Molecular Recognition" 3rd Annual Advances in Biomolecular Engineering: Protein Design Meeting, New York Academy of Sciences, New York, NY, June 2009

Gao, S. (presenter) Simon, M.J., Morrison III, B., and **Banta, S.** "Directed Evolution of Novel Cell Penetrating Peptides for Delivery to the Brain" 3rd Annual Advances in Biomolecular Engineering: Protein Design Meeting, New York Academy of Sciences, New York, NY, June 2009

Blenner, M.A. (speaker), Szilvay, G.R., Shur, O., Cropek, D.M., and **Banta, S.** "Intrinsically Disordered RTX Motifs as Scaffolds for Engineering Allosterically Controlled Biomolecular Recognition" Chemical Biology Discussion Group Meeting, New York Academy of Sciences, New York, NY, June 2009

Banta, S. (speaker) "Protein Engineering of a Thermostable Alcohol Dehydrogenase for Enzymatic Biofuel Cell Applications" Multi-Enzyme Cascades for Biofuel Oxidation and Hydrogen Evolution Mini-Symposium, Virginia Polytechnic Institute, Roanoke VA, Apr. 2009.

Banta, S. (speaker) "Enzymatic and Bioactive Hydrogels from Proteinaceous Bifunctional Building Blocks" Society for Biological Engineering, 2nd International Conference on Biomolecular Engineering, Santa Barbara CA, Jan. 2009.

Blenner, M.A. (presenter), Szilvay, G.R., Shur, O., Cropek, D.M., and **Banta, S.** "The Beta Roll Peptide as a Reversible, Calcium Sensitive, and Modular Scaffold for Engineering Allosteric Control over Biomolecular Recognition" Society for Biological Engineering, 2nd International Conference on Biomolecular Engineering, Santa Barbara CA, Jan. 2009.

Campbell, E., Wheeldon, I.R. **Banta, S.** (presenter) "Protein Engineering of a Thermostable Alcohol Dehydrogenase to Alter Cofactor and Substrate Specificities" Society for Biological Engineering, 2nd International Conference on Biomolecular Engineering, Santa Barbara CA, Jan. 2009.

Cropek, D. (speaker), **Banta, S.**, Blenner, M.A., Szilvay, G., Shur, O. "Beta Roll Peptide Structures for Allosterically Controlled Biomolecular Recognition and Decontamination" Chemical and Biological Defense Physical Science and Technology Conference, New Orleans, LA, Nov. 2008

Glykys, D.J. (speaker), Szilvay, G., Tortosa, P., Suarez, M., Jaramillo, A., and **Banta, S.** "Expression and Characterization of a Computationally Designed Laccase-Like Enzyme" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Wheeldon, I.R. (speaker), Joshua Gallaway, Scott Calabrese Barton and **Banta, S.** "Self-Assembling Bi-functional Proteins for Bioelectrocatalytic Hydrogels: A Protein Engineering Approach to Advanced Materials Design" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Campbell, E. (speaker) and **Banta, S.** "Protein Engineering of a Thermostable Alcohol Dehydrogenase to Alter Cofactor and Substrate Specificities" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Gao, S. (speaker), Simon, M.J., Morrison III, B., and **Banta, S.** "DNA Delivery to Neuronal-Like Cells Using Designed Recombinant Fusion Proteins" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Blenner, M.A. (presenter), Szilvay, G.R., Shur, O., Cropek, D.M., and **Banta, S.** "The Beta Roll as a Reversible, Calcium Sensitive, and Modular Scaffold for the Engineering of Biomolecular Recognition" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Wheeldon, I.R. (speaker) and **Banta, S.** "Enzymatic Hydrogels from Proteinaceous Bi-functional Building Blocks" AIChE Annual Meeting, Philadelphia, PA, Nov. 2008

Gao, S. (presenter), Simon, M.J., Morrison III, B., and **Banta, S.** "Engineering a Plasmid Display System for the Directed Evolution of Targeted Cell Penetrating Peptides" National Meeting of the American Chemical Society, Philadelphia, PA, Aug. 2008

Wheeldon, I.R. (speaker) and **Banta, S.** "Hydrogel forming enzymes: bifunctional proteins with enzymatic and cross-linking functionalities" National Meeting of the American Chemical Society, Philadelphia, PA, Aug. 2008

Szilvay, G. (presenter) Glykys, D., Tortosa, P., Suarez, M., Jaramillo, J., and **Banta, S.** "Expression and Characterization of a Computationally Designed Laccase-Like Enzyme" Symposium of the Protein Society, San Diego, CA, Jul. 2008

Wheeldon, I.R., and **Banta, S.** (speaker) "Self-assembling enzymatic and bioactive protein-based hydrogels" New York State pavilion, BIO 2008 International Meeting, San Diego, CA Jun. 2008

Gao, S. (presenter), Simon, M.J., Morrison III, B., and **Banta, S.** "Engineering of a Plasmid Display System for the Directed Evolution of Targeted Cell Penetrating Peptides" American Society for Microbiology General Meeting, Boston, MA, Jun. 2008

Wheeldon, I.R., Calabrese Barton, S., and **Banta, S.** (speaker) "Enzymatic and Bioactive proteinaceous hydrogels from bifunctional building blocks" Electrochemical Society Meeting, Phoenix, AZ, May 2008

Holland, J.T. (speaker), **Banta, S.**, Dolan, P., Arango, D., Manginell, M., Apblett, C., Harper, J., and Brozik, S. "Improving Glucose Oxidase Function in Fuel Cells" Electrochemical Society Meeting, Phoenix, AZ, May 2008

Wheeldon, I.R. (speaker), Calabrese Barton, S., and **Banta, S.** "Electron-Conducting Hydrogels from Bifunctional Metallo-Polypeptides" Electrochemical Society Meeting, Phoenix, AZ, May 2008

Cropek D.M., Chen, X.J. (presenter) West, A.C., and **Banta, S.** "Cytochrome c and superoxide dismutase based superoxide biosensors" Pittcon Conference and Expo, New Orleans, LA, Mar. 2008

Gao, S. (speaker), Simon, M., Morrison III, B., and **Banta, S.** "Engineering of peptides for the targeted delivery of proteins and DNA into brain cells" AIChE Annual Meeting, Salt Lake City UT, Nov. 2007

Chockalingam, K. (speaker) and **Banta, S.** "A Selection System for Engineering Structured Peptides" AIChE Annual Meeting, Salt Lake City UT, Nov. 2007

Blenner, M.A. (speaker) and **Banta, S.** "Single-Chain Antibody Based Peptide Conformational Change Sensor: A Tool For The Directed Evolution Of Stimulus Responsive Peptides " AIChE Annual Meeting, Salt Lake City UT, Nov. 2007

Glykys, D.J. (speaker) and **Banta, S.** "Metabolic Control Analysis For The Optimization Of Biofuel Cell Kinetic Performance" AIChE Annual Meeting, Salt Lake City UT, Nov. 2007

Wheeldon, I.R. (speaker), Calabrese Barton, S., and **Banta, S.** "Self-assembling bioactive protein-based hydrogels with tunable structural properties" AIChE Annual Meeting, Salt Lake City UT, Nov. 2007

Blenner, M., Chockalingam, K., and **Banta, S.** (speaker) "Directed Evolution of Conformational Changes in Peptides" National Meeting of the American Chemical Society , Boston, MA, Aug. 2007

Wheeldon, I. R., Calabrese Barton, S., and **Banta, S.** (presenter) "Bioactive protein-based hydrogels for functional bioelectrode construction" National Meeting of the American Chemical Society, Boston, MA, Aug. 2007

Gao, S. (presenter), Simon, M., Morrison III, B., and **Banta, S.** "Directed Evolution of Targeted Cell Penetrating Peptides for Trans-BBB Delivery" National Meeting of the American Chemical Society, Boston, MA, Aug. 2007

Simon, M. (presenter), Gao, S., **Banta, S.**, and Morrison III, B. "Protein delivery in brain cells using cell-penetrating peptides" National Neurotrauma Society Symposium, Kansas City, MO, Jul. 2007

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** (presenter) "Directed Evolution of Targeted Cell Penetrating Peptides for Trans-BBB Delivery" Symposium of the Protein Society, Boston, MA, Jul. 2007

Blenner, M., Chockalingam, K., and **Banta, S.** (presenter) "Directed Evolution of Conformational Changes in Peptides" Symposium of the Protein Society, Boston, MA, Jul. 2007

Wheeldon, I. R., Calabrese Barton, S., and **Banta, S.** (presenter) "Bioactive protein-based hydrogels for functional bioelectrode construction" Symposium of the Protein Society, Boston, MA, Jul. 2007

Blenner, M., Chockalingam, K., and **Banta, S.** (presenter) "Directed Evolution of Conformational Changes in Peptides" Biochemical Engineering XV, Quebec City, Canada, Jul. 2007

Wheeldon, I. R., Calabrese Barton, S., and **Banta, S.** (presenter) "Bioactive protein-based hydrogels for functional bioelectrode construction" Biochemical Engineering XV, Quebec City, Canada, Jul. 2007

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** (presenter) "Directed Evolution of Targeted Cell Penetrating Peptides for Trans-BBB Delivery" Biochemical Engineering XV, Quebec City, Canada, Jul. 2007

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** (speaker) "Directed Evolution of Cell Penetrating Peptides for Delivery Across the Blood Brain Barrier to Specific Cellular Targets" Invited research seminar, 7th Annual Packard Center for ALS Research Symposium, Baltimore, MD, Apr. 2007

Blenner, M., Chockalingam, K., and **Banta, S.** (presenter) "Directed Evolution of Peptide Conformational Changes" Society for Biological Engineering, International Conference on Biomolecular Engineering, San Diego CA, Jan. 2007.

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** (presenter) "Directed Evolution of Targeted Cell Penetrating Peptides for Trans-BBB Delivery" Society for Biological Engineering, International Conference on Biomolecular Engineering, San Diego CA, Jan. 2007.

Blenner, M., Chockalingam, K., and **Banta, S.** (presenter) "Directed Evolution of Peptide Conformational Changes" AIChE Annual Meeting, San Francisco CA, Nov. 2006.

Gao, S., Simon, M., Morrison III, B., and **Banta, S.** (speaker) "Directed Evolution of Cell Penetrating Peptides for Delivery Across the Blood Brain Barrier to Specific Cellular Targets" Invited research seminar, 6th Annual Packard Center for ALS Research Symposium, Baltimore, MD, Apr. 2006

SELECTED OTHER PRESENTATIONS (1998-2004)

Banta, S. (speaker), Casali, M., Kelly, Z, Mavroidis, C., and Yarmush, M. "Site-directed mutagenesis of a peptide from the hemagglutinin protein of the influenza virus: potential application for nanorobotics" AIChE Annual Meeting, Austin TX, Nov. 2004.

Banta, S. (presenter), Casali, M., Kelly, Z, Mavroidis, C., and Yarmush, M. "Site-directed mutagenesis of a peptide from the hemagglutinin protein of the influenza virus: potential application for nanorobotics" Symposium of the Protein Society, San Diego CA, Aug. 2004.

Banta, S. (speaker), Yokoyama, T., Berthiaume, F., and Yarmush, M. "Attenuation of Post-Burn Hypermetabolism: A Clinical Intervention Characterized by Metabolic Flux Analysis" AIChE Annual Meeting, San Francisco CA, Nov. 2003.

Banta, S. (presenter), Yokoyama, T., Berthiaume, F., and Yarmush, M. "Metabolic Flux Analysis of the perfused rat hindquarter: Effects of thermal injury with and without insulin" AIChE Annual Meeting, San Francisco CA, Nov. 2003.

Banta, S. (presenter), Yokoyama, T., Berthiaume, F., and Yarmush, M. "Metabolic Flux Analysis of the perfused rat hindquarter: Effects of thermal injury with and without insulin" BMES Annual Meeting, Nashville TN, Oct. 2003.

Banta, S. (speaker) "Metabolic Engineering: Advances in Modeling and Intervention in Health and Disease" Center for Engineering and Medicine Summer Minisymposium, Boston MA, Aug. 2003.

Banta, S. (speaker), Yokoyama, T., Berthiaume, F., and Yarmush, M. "Metabolic flux analysis of skeletal muscle in post-burn hypermetabolism" AIChE Annual Meeting, Indianapolis IN, Nov. 2002.

Banta, S. (speaker) and Anderson, S. "Engineering the cofactor specificity of *Corynebacterium* 2,5-diketo-D-gluconic acid reductase for use in vitamin C biosynthesis" AIChE Annual Meeting, Reno NV, Oct. 2001.

Banta, S. (presenter) and Anderson, S. "Site-Directed Mutagenesis of 2,5-diketo-D-Gluconic Acid Reductase for Use in Vitamin C Biosynthesis in a Metabolically Engineered Organism" AIChE Annual Meeting, Miami FL, Nov. 1998.

ACADEMIC SERVICE

Undergraduate Committee, Dept. of Chemical Engineering, Columbia	2007-Present
Faculty Search Committee, Dept. of Chemical Engineering, Columbia	2006-07, 2008-09
Safety Officer, Dept. of Chemical Engineering, Columbia	2004-Present
Graduate Committee, Dept. of Chemical Engineering, Columbia	2004-07

PROFESSIONAL SERVICE

NATIONAL MEETING ORGANIZATION

Academic Program Chair, Biochemical Technologies Division (BIOT), American Chemical Society Annual Meeting, Anaheim, CA March 2011

Area 15c Program Chair, American Institute of Chemical Engineers Annual Meeting, Salt Lake City UT, November 2010.

Area Coordinator for Emerging Technologies, Biochemical Technologies Division (BIOT), American Chemical Society Annual Meeting, San Francisco, CA March 2010

Area 15c Vice Program Chair, American Institute of Chemical Engineers Annual Meeting, Nashville TN, November 2009.

NATIONAL MEETING SESSION ORGANIZATION

Co-Chair for "Design of Biomolecular Structures" Biochemical and Molecular Engineering XVII, Seattle, WA, June 2011

Chair for "Evolutionary Engineering of Proteins" Society for Biological Engineering, 3rd International Conference on Biomolecular Engineering, San Francisco CA, January 2011.

Chair for "Protein Engineering I" American Institute of Chemical Engineers Annual Meeting, Nashville TN, November 2009.

Co-Chair for "Advances in Metabolic Engineering I & II" American Chemical Society National Meeting, Washington, D.C., August 2009.

Co-Chair for "Engineering Pathways and Complex Phenotypes" Society of Biological Engineering, 2nd International Conference on Biomolecular Engineering, Santa Barbara, CA, January 2009.

Chair for "Protein Engineering I" American Institute of Chemical Engineers Annual Meeting, Philadelphia PA, November 2008.

Vice-Chair for "Advances in Biocatalysis I & II" American Institute of Chemical Engineers Annual Meeting, Philadelphia PA, November 2008.

Chair for "In Honor of Ed Leonard on the Occasion of his 75th Birthday" American Institute of Chemical Engineers Annual Meeting, Salt Lake City UT, November 2007.

Vice-Chair for "Protein Engineering" American Institute of Chemical Engineers Annual Meeting, San Francisco CA, November 2006.

Vice-Chair for "Intracellular Processes" American Institute of Chemical Engineers Annual Meeting, San Francisco CA, November 2006.

Co-Chair for "Cellular and Functional Tissue Engineering: Metabolic Engineering" IEEE-Engineering in Medicine and Biology Society, New York NY, August 2006.

Vice-Chair for "Systems Engineering Approaches in Biology" American Institute of Chemical Engineers Annual Meeting, Cincinnati OH, October 2005.

AD HOC MANUSCRIPT REVIEWS:

Advanced Functional Materials; Advanced Materials; Analyst; Analytical Chemistry; Applied Microbiology and Biotechnology; Biochemistry; Bioconjugate Chemistry; Bioinformatics; Biomacromolecules; Bioorganic and Medicinal Chemistry Letters; Biophysical Journal; Biotechnology and Bioengineering; Biotechnology Progress; BMC Systems Biology; Cancer Letters; ChemBioChem; Current Opinion in Biotechnology; Electrochemistry Communications; Electrochimica Acta; Expert Opinion on Drug Delivery; FASEB Journal; Gene Therapy; Journal of Applied Biochemistry and Biotechnology; Journal of Biotechnology; Journal of the American Chemical Society; Journal of Pharmacology and Experimental Therapeutics; Molecular Pharmaceutics; Proceedings of the National Academy of Sciences of the U.S.A.; Protein Engineering, Design and Selection; Protein Science; Pure and Applied Chemistry; Sensors & Actuators: B. Chemical; Small

STUDENT SUPERVISION

SPONSORED PHD STUDENTS (4 TOTAL)

Doris Glykys (PhD 2010) "Modeling and engineering of oxidoreductase proteins for miniaturized energy applications" (Current Position - Chemical Engineer at Merck & Co.)

Shan Gao (PhD 2009) "Characterization of the TAT cell penetrating peptide and directed evolution of new cell penetrating peptides for protein and nucleotide delivery to neuronal-like cells (Current Position - Postdoctoral Fellow with Martin Yarmush, Massachusetts General Hospital and Harvard Medical School)

Mark Blenner (PhD 2009) "Tools for the design and engineering of stimulus responsive peptides and intrinsically disordered peptide scaffolds (Current Position - Postdoctoral Fellow with Timothy Springer, Harvard Medical School)

Ian Wheeldon (PhD 2009) "Bifunctional protein building blocks for functional hydrogel assembly" (Award of Distinction) (Current Position - Postdoctoral Fellow with Ali

Khademhosseini, Harvard-MIT Health Sciences Technology, Harvard Medical School)

PREVIOUS POSTDOCTORAL FELLOWS (6 TOTAL)

Dr. Jun Wu (2009-2010), (PhD 2006 from Case Western Reserve University, Current Position – Scientist at Atotech)

Dr. Geza Szilvay (2008-10), (PhD 2007 from University of Helsinki, Finland, Current Position – Research Scientist, VTT Technical Research Centre, Finland)

Dr. Jong Pil Park (2008-2009), (PhD 2004 from KAIST, South Korea, Current Position - Assistant Professor of Herbal Pharmaceutical Engineering, Daegu Haany University, Korea)

Dr. J. Todd Holland (2007-2009), (PhD 2007 from University of Illinois, Urbana-Champagne, Current Position - Postdoctoral Fellow, Virginia Tech)

Dr. Xiaojun Chen (2007-2008), (PhD 2003 from Nanyang Technological University, Singapore, Current Position - Research Scientist, Institute of Bioengineering and Nanotechnology, Singapore)

Dr. Karuppiah Chockalingam (2006-2008), (PhD 2006 from University of Illinois, Urbana-Champagne, Current Position - Research Professor, Texas A&M University)

CURRENT PHD STUDENTS (6 TOTAL)

Kevin Dooley (PhD Expected 2015)

Tushar Patel (PhD Expected 2015)

Asli Sahin (Co-mentored with A. West, PhD Expected 2014)

Oren Shur (PhD Expected 2012)

Flora Felsovalyi (Co-mentored with S. Kumar, PhD Expected 2012)

Elliot Campbell (PhD Expected 2011)

CURRENT POSTDOCTORAL FELLOWS (3 TOTAL)

Dr. Wendell Khunjar (2010-), Co-Advised with Kartik Chandran, Earth and Environmental Engineering, (PhD 2010 from University of Michigan)

Dr. Matthew Lluis (2010-), (PhD 2009 from University of Texas)

Dr. Yang Hee Kim (2009-), (PhD 2009 from Soul National University, Korea)

CURRENT RESEARCH SCIENTISTS (1 TOTAL)

Dr. Dmitri Ivnitski (2010-)

PHD THESIS COMMITTEES (15 TOTAL)

Melissa Simon (2010) "Evaluation and Development of Cell Penetrating Peptides for Brain Cell Delivery" (Barclay Morrison III Advisor, Dept of Biomed Eng)

Sumit Sharma (2010) "Conformational Changes in Proteins Upon Adsorption to Surfaces" (Sanat Kumar Advisor)

Ugur Emekli (2010) "Initial Stages of Direct Copper Electrodeposition: Simulation and Experiment" (Alan West Advisor)

Napoleon Tercero (2010) "Characterization and Application of Morpholino Monolayers in Nucleic Acid Diagnostics" (Rastislav Levicky Advisor)

Kristin Shattuck McKenzie (2010) "An Electrochemical Investigation of the Removal and Planarization of Copper and Ruthenium" (Alan West Advisor)
Adam Whalley (2009) "Carbon Nanotubes: Single Molecule Electronics and Progress Towards End Cap Synthesis" (Colin Nuckolls Advisor, Dept of Chemistry)
Owen Crowther (2009) "*In situ* Observations of Lithium Dendrite Growth" (Alan West Advisor)
Ensing Lin (2009) "Mathematical Modeling and Simulation of a Cylindrical Nickel Metal Hydride Battery" (Huk Cheh Advisor)
Hongjun Liu (2009) "Computer Simulation of Self-assembly of Complex Systems: Application to Globular Proteins and Grafted Nanoparticles" (Sanat Kumar Advisor)
Robert Bozic (2008) "Developing Methods for the Detection of Ordnance Related Compounds" (Alan West Advisor)
Mona Larsen (2007) "Understanding Particulate Flow in Microfluidics and Novel Designs of Biopolymer Nanoparticles" (Nina Shapley Advisor)
Joshua Gallaway (2007) "Redox Polymer Mediation for Enzymatic Biofuel Cells" (Scott Calabrese-Barton Advisor)
Yuhao Sun (2006) "Electrodes for Biocatalytic Fuel Cells" (Scott Calabrese-Barton Advisor)
Gang Shan (2005) "DNA Monolayers: Precipitation and Electrochemical Characterization" (Rastislav Levicky Advisor)
Hameer Ruparel (2005) "Novel DNA Sequencing and Genotyping Approaches Using Modified Nucleotide Analogues" (Jingyue Ju Advisor)

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers
American Association for the Advancement of Science
The Protein Society
American Chemical Society
The Electrochemical Society
The New York Academy of Sciences